PRE-DECISIONAL DRAFT (04/24/01)

MEMORANDUM

To: Mary Lou Soscia, Columbia River Coordinator
Office of Ecosystems and Communities

From: Ben Cope, Environmental Engineer
Office of Environmental Assessment
Risk Evaluation Unit

Re: Water Temperature Simulations for the Snake River using NMFS Flow Scenarios

Per your request, we have used the EPA's one-dimensional RBM10 model[1] to generate 2001 daily average temperature projections for the Columbia River mainstem using flow scenarios provided by Jim Ruff of the National Marine Fisheries Service (NMFS) in emails dated April 16 and April 19, 2001.

To perform a projection using a model such as RBM10, it is necessary to piece together a set of model assumptions and inputs. The NMFS spreadsheet includes 2001 flow scenarios for Lower Granite Dam, Brownlee Dam, and Dworshak Dam. The second email explained a second Dworshak release scenario to be simulated, one that presumes a lower volume of fill in the reservoir and an associated early cut-off of flow augmentation.

The model boundary on the Snake River is Anatone, and it is necessary to estimate the flow at Anatone associated with the flows provided by NMFS for Lower Granite and Brownlee. In this case, we simply estimated the Clearwater flow as 50% of the difference between flows at Brownlee and Lower Granite. The remainder was added to the flow at Brownlee to estimate the flow of the Snake River at Anatone.

At this time, we do not have estimates for 2001 flow and water temperature for the tributaries (other than the Clearwater) needed to run the simulations. In the absence of such estimates, we used actual tributary flows from a low flow year (1977).

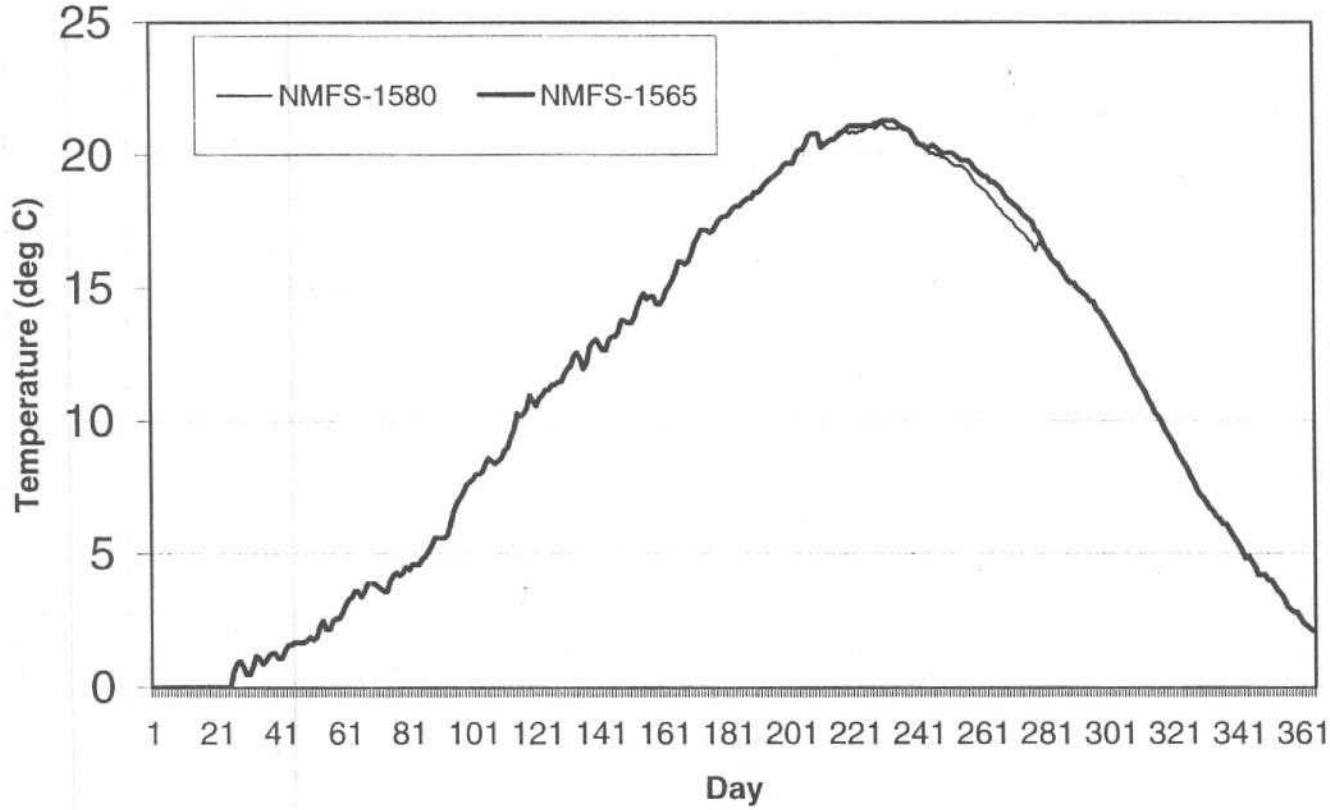
For Dworshak releases, we combined the NMFS flow scenarios with year 2000 water temperatures to reflect the most recent release temperatures. For all other upstream boundary and tributary inflows, 1977 water temperatures were assumed.

The model was run using actual meteorological data for 1977 and 1998.

Outputs from the RBM10 model are presented graphically, and we provide a few statistics to assist in interpretation. Outputs are included for the Snake River at Ice Harbor Dam, Little Goose Dam, and Lower Granite Dam. NMFS also requested a comparison to earlier simulations using CRITFC proposed flows, and we included these results alongside the NMFS results using 1998 meteorology.

[1] Yearsley, J.R. 1999. Columbia River temperature assessment: Simulation methods. EPA Region 10, Seattle, Washington. 74 pp. + appendices.

Figure 2A: Comparison of Simulated Temperatures at Ice Harbor Dam
1977 Meteorology

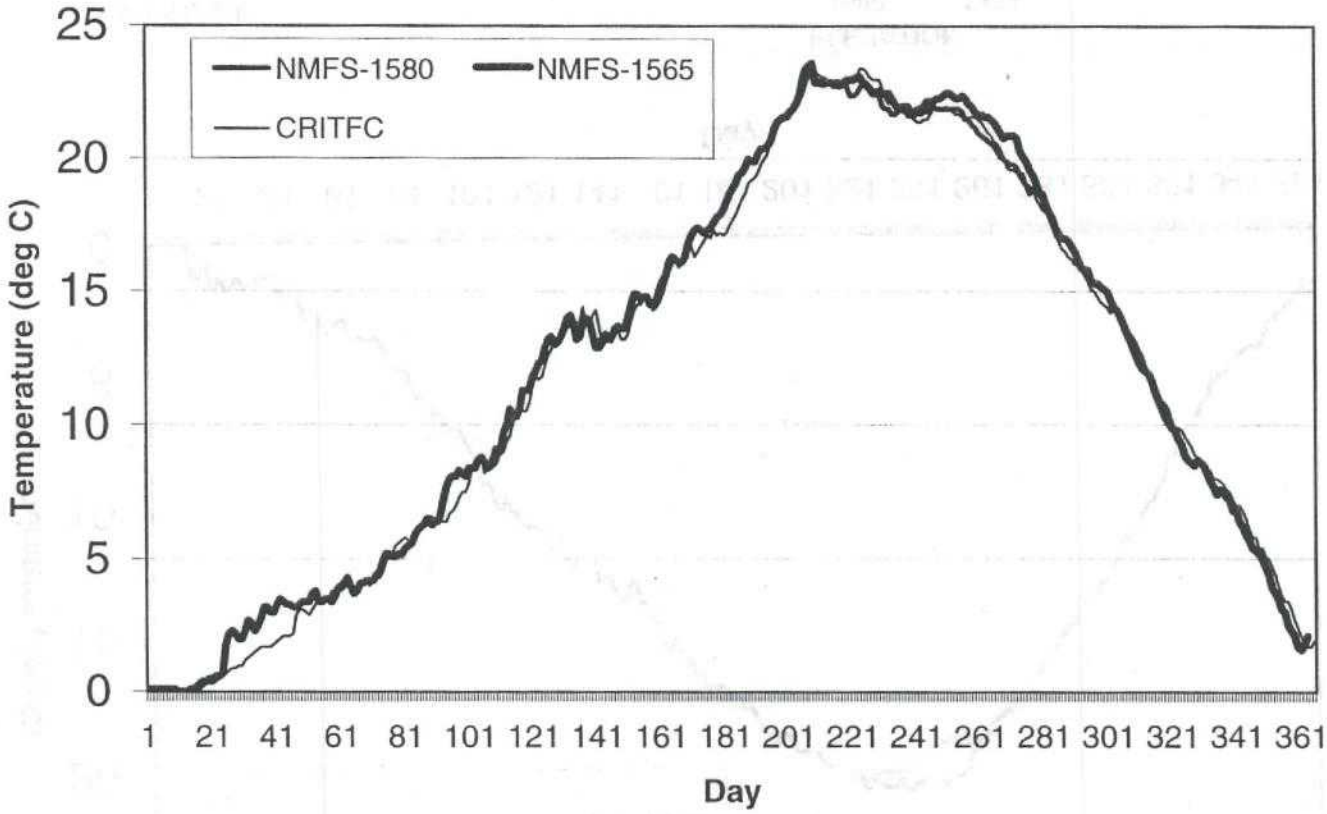


This run used:
1977 tributary flows
1977 meteorology

	ELEVATION 1580	1565
max temp	21.2	21.3
days>20	43	49

max difference (1580 vs. 1565) 0.8

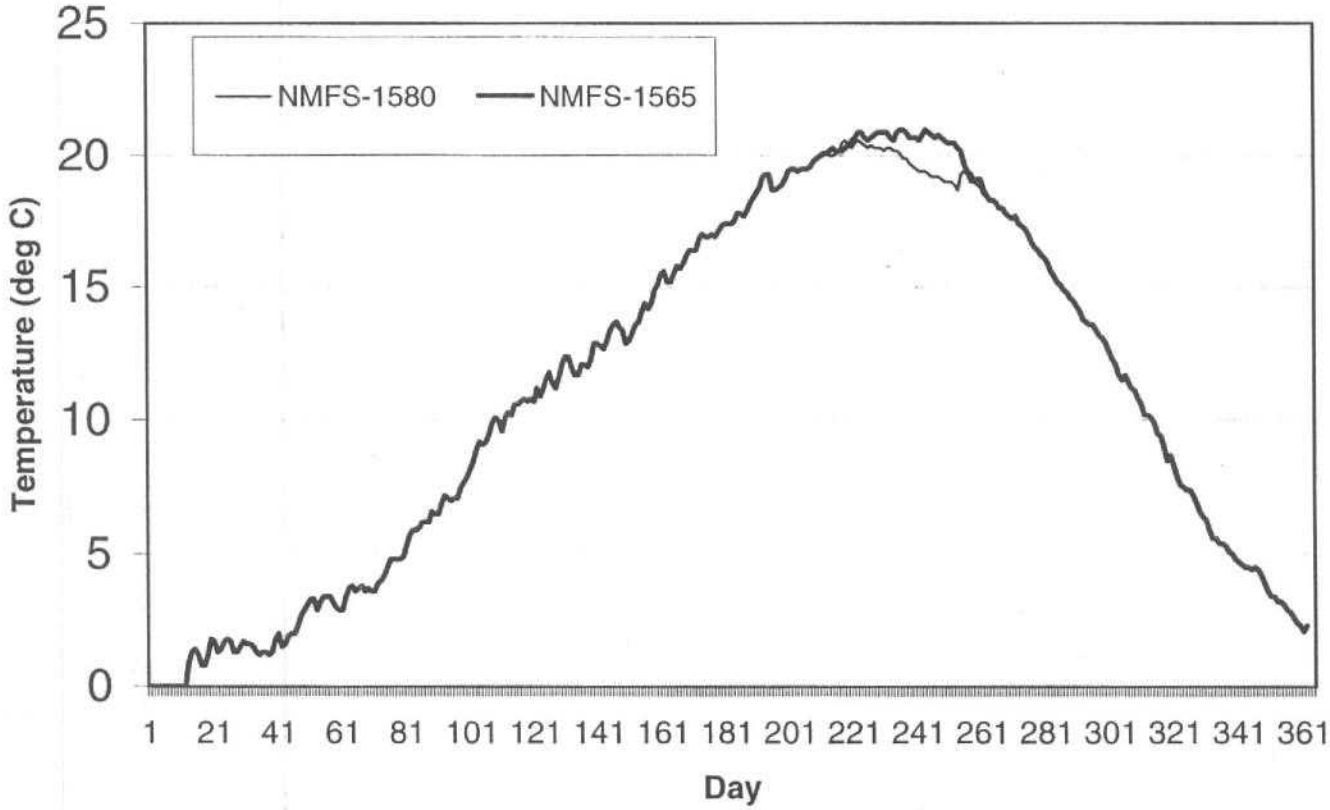
Figure 2B: Comparison of Simulated Temperatures at Ice Harbor Dam
1998 Meteorology



This run used:
1977 tributary flows
1998 meteorology

	ELEVATION 1580	1565
max temp	23.5	23.6
days>20	77	84
max difference (1580 vs. 1565)	1.1	

Figure 3A: Comparison of Simulated Temperatures at Little Goose Dam
1977 Meteorology

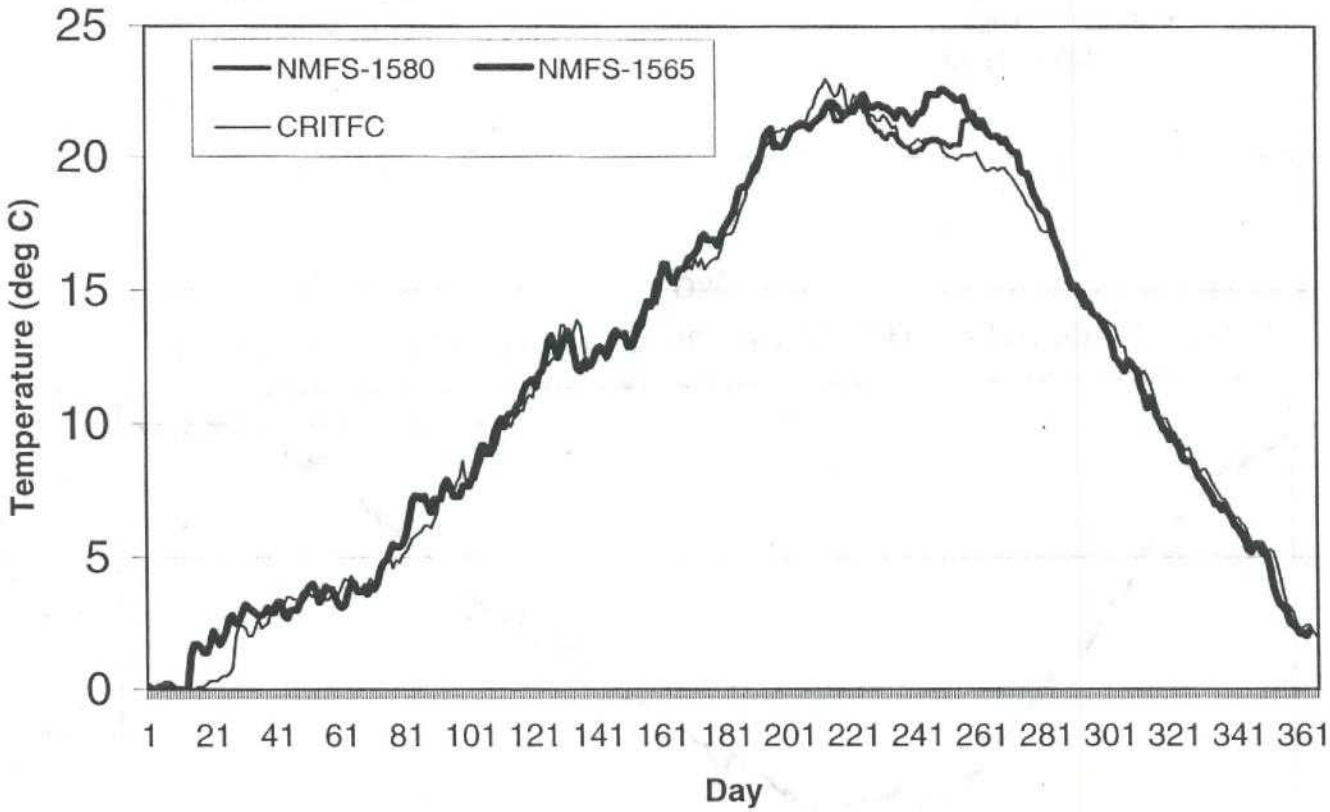


This run used:
1977 tributary flows
1977 meteorology

	ELEVATION 1580	1565
max temp	20.6	21
days>20	22	44

max difference (1580 vs. 1565) 1.6

Figure 3B: Comparison of Simulated Temperatures at Little Goose Dam
1998 Meteorology

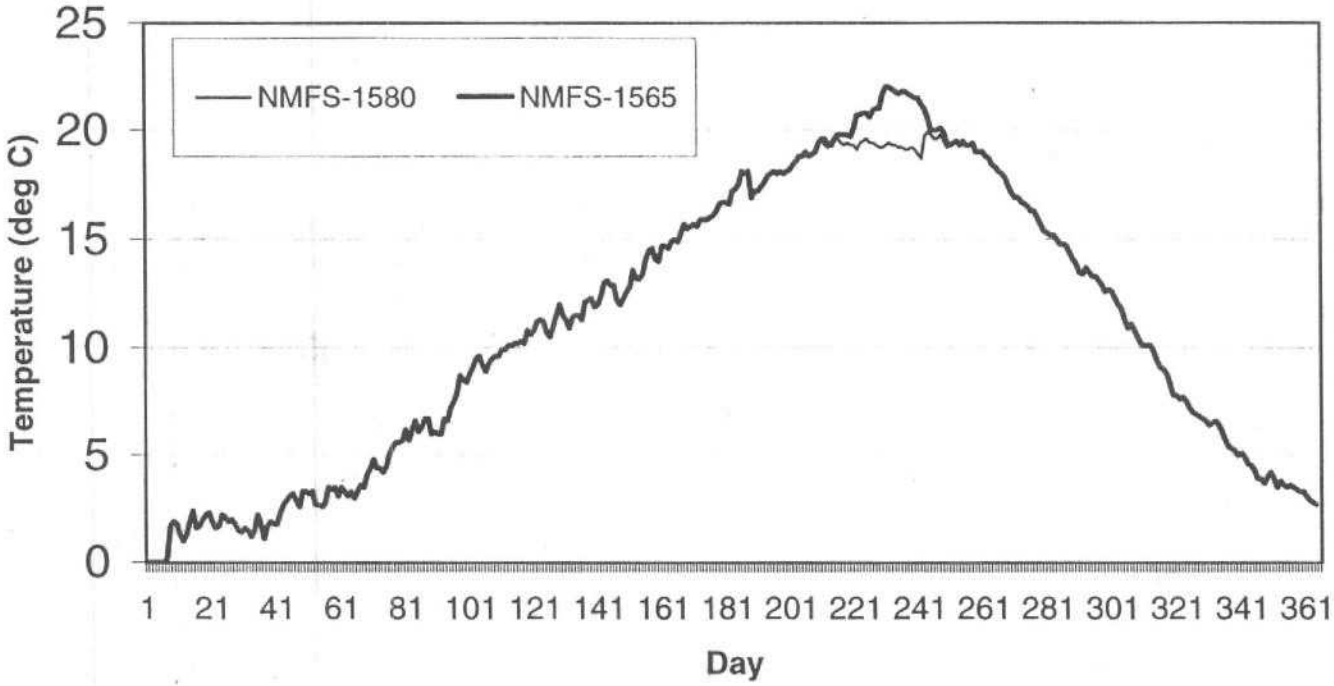


This run used:
1977 tributary flows
1998 meteorology

	ELEVATION 1580	1565
max temp	22	22.6
days>20	81	81

max difference (1580 vs. 1565) 2

Figure 4A: Comparison of Simulated Temperatures at Lower Granite Dam
1977 Meteorology

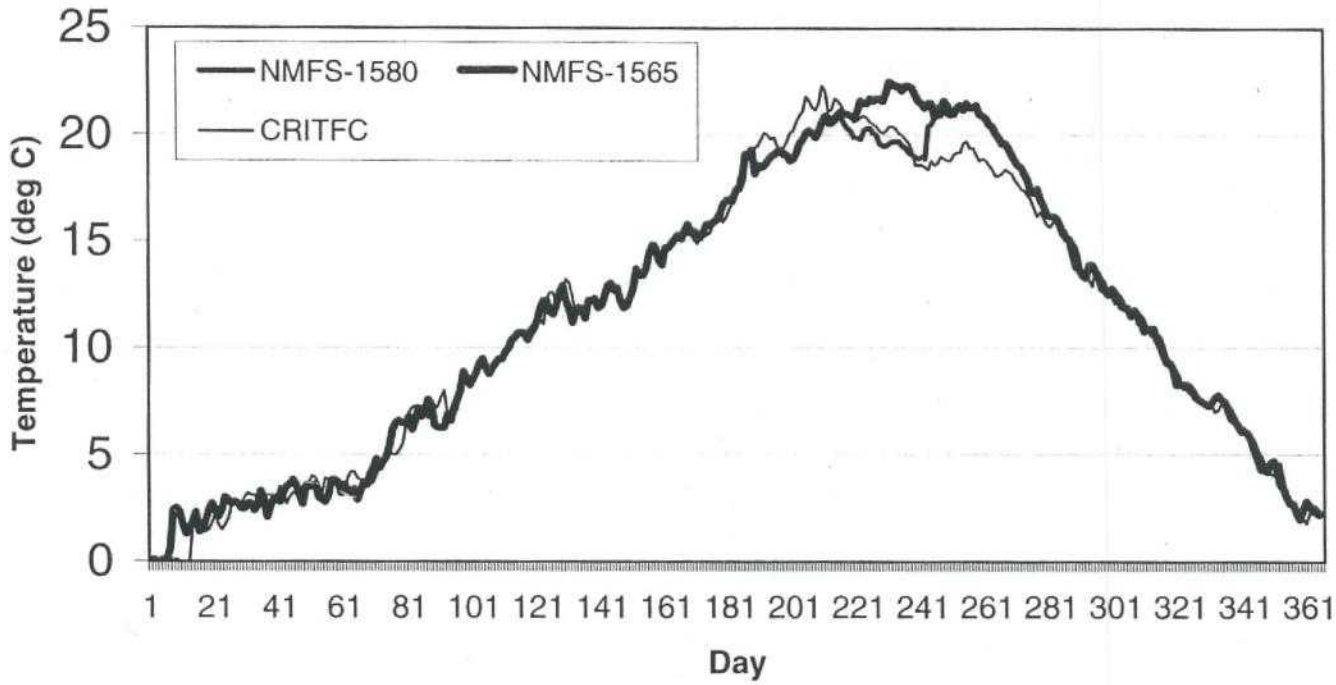


This run used:
1977 tributary flows
1977 meteorology

	ELEVATION 1580	1565
max temp	19.9	22
days>20	0	25

max difference (1580 vs. 1565) 2.7

Figure 4B: Comparison of Simulated Temperatures at Lower Granite Dam
1998 Meteorology



This run used:

1977 tributary flows
1998 meteorology

	ELEVATION	
	1580	**1565**
max temp	21.5	22.5
days>20	40	59

max difference (1580 vs. 1565) 3.1